

# THINKING ABOUT SPACE AND TIME: 100 YEARS OF APPLYING AND INTERPRETING GENERAL RELATIVITY

## TUESDAY, SEPT 12

09.15-09.30 Welcome

### COSMOLOGY I

09.30-10.45 Chris Smeenk (London, Ontario)  
title tba

10.45-11.00 Coffee break

11.00-11.45 Cormac O’Raifeartaigh (Waterford)  
*Historical and Philosophical Aspects of the Einstein World*

11.45-12.30 Casey D. McCoy (Edinburgh)  
*A Thematic Tour of 20th Century Cosmology: Stability From Einstein and Eddington to Inflation*

12.30-14.00 Lunch break

### SPACE-TIME AND MOTION

14.00-15.15 Jim Weatherall (Irvine)  
*Motion of Small Bodies in General Relativity*

15.15-15.45 Coffee break

15.45-16.30 Damian Luty (Poznan)  
*Strategies of Discerning Spacetime Points in Spacetime Structuralism*

16.30-17.15 James Read (Oxford)  
*Two Miracles of General Relativity*

### HISTORY I

17.15-18.00 Galina Weinstein (Haifa)  
*Two-Body Problem in General Relativity as a Heuristic Guide in Einstein’s Work on the Einstein-Rosen-Bridge (ER) and on the Einstein-Podolsky-Rosen (EPR) Argument*

19.30 Conference dinner

## WEDNESDAY, SEPT 13

### HISTORY II

09.15-10.00 Claus Kiefer (Köln)  
*Space and Time 62 years after the Bern Relativity Conference*

10.00-10.45 Sjang ten Hagen & Jeroen van Dongen (Amsterdam)  
*Global Historiography and the Belgian Reception of Relativity*

10.45-11.15 Coffee break

11.15-12.30 Marco Giovanelli (Tübingen)  
*„All physics is Metaphysics“. On Émile Meyerson’s Influence on Einstein’s late Rationalistic Realism*

12.30-14.00 Lunch break

### SOLUTIONS TO EINSTEIN’S FIELD EQUATIONS

14.00-15.15 Sabine Hossenfelder (Frankfurt)  
*Black Hole Information - What’s the Problem?*

15.30-15.45 Coffee break

15.45-16.30 Carina Prunkl & Chris Timpson (Oxford)  
*Black Hole Entropy Is Entropy (and not Information)*

16.30-17.15 Dennis Lehmkuhl (Pasadena)  
*The Interpretation of Vacuum Solutions to Einstein’s Field Equations*

17.30-18.45 Dan Kennefick (Fayetteville)  
*A History of Gravitational Wave Emission*

20.00 Public evening lecture: John Norton (Pittsburgh)  
*The Error that Showed the Way: Einstein’s Path to his Gravitational Field Equations*

## THURSDAY, SEPT 14

### COSMOLOGY II AND PRINCIPLES OF GR

09.15-10.30 Ruth Durrer (Geneva)  
*Cosmology: The Problem of Dark Energy*

10.30-11.00 Coffee break

11.00-11.45 Ryan Samaroo (Bristol)  
*Friedman and Some of his Critics on the Foundations of General Relativity*

11.45-12.30 Niels Linnemann (Geneva)  
& Manus Visser (Amsterdam)  
*GR, quo vadis? - Indications for an Emergent Nature of Gravity*

12.30-14.00 Lunch break

### SYMMETRIES

14.00-14.45 Neil Dewar (Munich)  
*Symmetries, the Dynamical Approach to Spacetime, and General Covariance*

14.45-15.30 Joanna Luc (Cracow)  
*Kretschmann’s Objection and the Problem of the Physical Interpretation of a Theory*

15.30-16.00 Coffee break

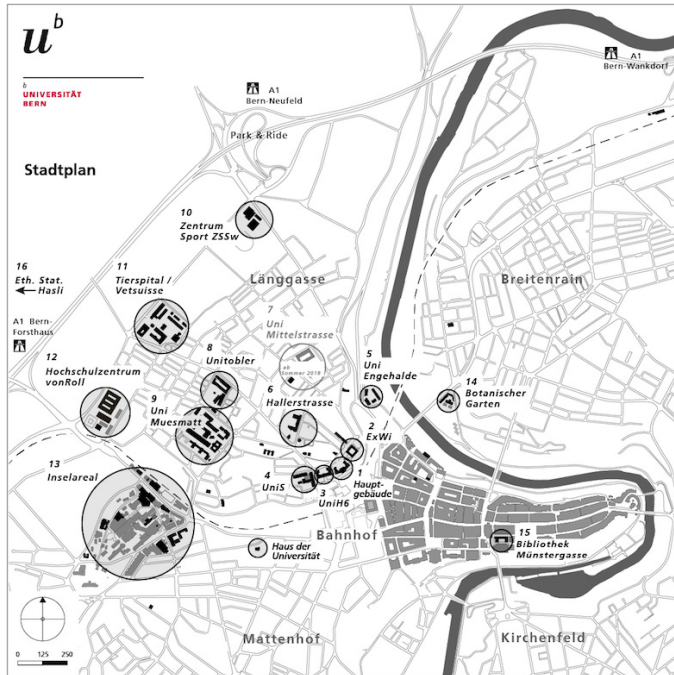
16.00-16.45 Valeriya Chasova (Louvain-la-Neuve)  
*Noether’s Theorems and Energy Conservation in General Relativity*

16.45-17.30 Samuel Fletcher (Minneapolis, Munich)  
*Approximate Space-Time Symmetry*

17.30 -18.00 Wrap-up

19.00 Guided tour Einsteinhaus

## MAP



VENUE: University of Bern  
Room F - 122  
Unitobler  
Lerchenweg 36  
CH - 3000 Bern

About one hundred years ago, in late 1915, Einstein came up with his gravitational field equations of the General Theory of Relativity. This is often celebrated as one of the most momentous events in the history of science, but at that time, a new theoretical understanding of gravitation had really only begun. No exact solutions to the field equations were known, and the implications of the theory were almost unexplored. It is no surprise, then, that the publication of the field equations gave rise to pioneering research – think of Karl Schwarzschild's black hole solution to the equations, Einstein's discussion about gravitational waves or his first relativistic world model. Since the theory has far-reaching implications for our understanding of space and time, the discovery of the field equations was also followed by intense philosophical discussions to which prominent proponents of positivism and neo-Kantianism, e.g. M. Schlick and E. Cassirer, made contributions of lasting importance. All in all it seems fair to say that, in November 1915, the theory had only just been born; what we now know and value as General Theory of Relativity with all its features only came into being during the investigations and discussions that ensued after the discovery of the field equations.

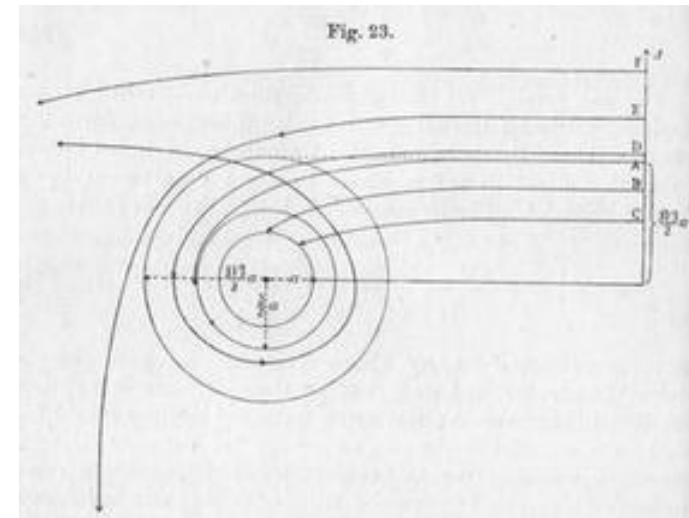
One hundred years after the first pioneering applications of, and reactions to, Einstein's momentous discovery, this conference aims at an integrated understanding of how Einstein's theory of relativity gained momentum. The focus is on the early reception of Einstein's theory in physics and philosophy and on the systematic questions that emerged shortly after Einstein's discovery of the field equations. The conference brings together historians of science, philosophers, and physicists.

# THINKING ABOUT SPACE AND TIME: 100 YEARS OF APPLYING AND INTERPRETING GENERAL RELATIVITY

BERN, SEPTEMBER 12 - 14, 2017

INTERDISCIPLINARY CONFERENCE

ORGANIZERS: Claus Beisbart (Bern)  
Tilman Sauer (Mainz)  
Christian Wüthrich (Geneva)



**Light rays according to the Schwarzschild solution of the field equations.**  
(source: M. v. Laue 1921, Die Relativitätstheorie. Bd. 2. Die allgemeine Relativitätstheorie und Einsteins Lehre von der Schwerkraft, Braunschweig: F. Vieweg, p. 226)

**FNSNF**  
FONDS NATIONAL SUISSE  
SCHWEIZERISCHER NATIONALFONDS  
FONDO NAZIONALE SVIZZERO  
SWISS NATIONAL SCIENCE FOUNDATION

**u<sup>b</sup>**  
UNIVERSITÄT  
BERN  
AEC  
ALBERT EINSTEIN CENTER  
FOR FUNDAMENTAL PHYSICS

**UNIVERSITÉ  
DE GENÈVE**  
**JG|U**  
JOHANNES GUTENBERG  
UNIVERSITÄT MAINZ

The Thomalla Foundation

UBS Culture Foundation